

Interview Summary	Application No.	Applicant(s)	
	09/641,206	HIRABAYASHI, TAKAYUKI	
	Examiner	Art Unit	
	Stephen E. Jones	2817	

All participants (applicant, applicant's representative, PTO personnel):

- (1) Stephen E. Jones. (3) _____
 (2) David Rozenblat, 47,044. (4) _____

Date of Interview: 3/30/04

Type: a) ☐ Telephonic b) ☐ Video Conference
 c) ☒ Personal [copy given to: 1) ☐ applicant 2) ☒ applicant's representative]

Exhibit shown or demonstration conducted: d) ☐ Yes e) ☒ No.
 If Yes, brief description: ~~9+29~~

Claim(s) discussed: 9+29

Identification of prior art discussed: Tsutomu of Record, + Adkins of record.

Agreement with respect to the claims f) ☐ was reached. g) ☐ was not reached. h) ☒ N/A.

Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: Discussed the prior art (above) as related to the claims. It was indicated by the examiner that it appears new Claim 29 would overcome the Adkins rejection.
 (A fuller description, if necessary, and a copy of the amendments which the examiner agreed would render the claims allowable, if available, must be attached. Also, where no copy of the amendments that would render the claims allowable is available, a summary thereof must be attached.)

THE FORMAL WRITTEN REPLY TO THE LAST OFFICE ACTION MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW. (See MPEP Section 713.04). If a reply to the last Office action has already been filed, APPLICANT IS GIVEN ONE MONTH FROM THIS INTERVIEW DATE, OR THE MAILING DATE OF THIS INTERVIEW SUMMARY FORM, WHICHEVER IS LATER, TO FILE A STATEMENT OF THE SUBSTANCE OF THE INTERVIEW. See Summary of Record of Interview requirements on reverse side or on attached sheet.

Note: Also provided applicant's representative with a machine translation of Tsutomu (JP405267913A).

Examiner Note: You must sign this form unless it is an Attachment to a signed Office action.

Stephen E. Jones
 Examiner's signature, if required

* NOTICES *

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1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] this invention relates to the signal-line way with which the dielectric-layer front face of the electronic parts for RFs was equipped.

[0002]

[Description of the Prior Art] As shown in drawing 5 or drawing 6, while equipping with the signal-line way 20 one front face of a dielectric layer (not shown) which consists of polyimide resin etc. as the above-mentioned signal-line way, the front face of another side of the same dielectric layer is equipped with the mesh ground plane 30 which carried out the shape of a mesh, and the signal-line way which made the characteristic impedance of the signal-line way 20 match with about 50 etc.ohms etc. by the mesh ground plane 30 is known.

[0003] Drawing 5 or drawing 6 shows the perspective drawing which eliminated the signal-line way 20 and the mesh ground plane 30, and looked at the dielectric layer between them for them from the upper part.

[0004] The dielectric layer which the reason for having formed the mesh ground plane 30 which carried out the shape of not a ground plane but a mesh in the front face of another side of a dielectric layer here becomes from polyimide resin etc. is usually because the grand effect becomes large too much and the characteristic impedance of the signal-line way 20 becomes low sharply from 50 etc.ohms etc., when it cannot form but the front face of another side of a dielectric layer is equipped with a ground plane thinly with 15-20 micrometers about the thickness. That is, it is because it is necessary to have the mesh ground plane 30 which replaced with the ground plane on the front face of another side of a dielectric layer, and carried out the shape of a mesh, to weaken the grand effect, and to raise the characteristic impedance of the signal-line way 20 to 50 etc.ohms etc. by the mesh ground plane 30.

[0005]

[Problem(s) to be Solved by the Invention] however, as mentioned above, when the front face of another side of a dielectric layer is equipped with the mesh ground plane 30 The grand effect of signal-line way 20 portion which counters the opening portion 34 equivalent to the mesh of the mesh ground plane 30 through a dielectric layer It compares with signal-line way 20 portion which counters **** 32 of other mesh-ground planes through a dielectric layer. The characteristic impedance of signal-line way 20 portion which is weak and counters the opening portion 34 through a dielectric layer has become high compared with the characteristic impedance of other signal-line way 20 portions.

[0006] In other words, without the ability covering the overall length and making the characteristic impedance of the signal-line way 20 match with 50 etc.ohms of constant value etc. exactly, by signal-line way 20 every place, the characteristic impedance becomes high or has become low at the mesh ground plane 30 which carried out the shape of a mesh.

[0007] In addition, in order to cancel such a difficulty, as shown in the drawing 6 right-hand side, making the signal-line way 20 counter with **** 32 of a mesh ground plane, and preparing for one front face of a dielectric layer is performed.

[0008] However, as shown in the same drawing 6 right-hand side, in such a case, the configuration of the decussation part of **** 32 had to be imitated, the bending part of the signal-line way 20 had to be keenly bent in the shape of a right angle etc., and it was not able to avoid to it that the reflection loss of the RF signal transmitted in the bending part of the signal-line way 20 bent keenly increased.

[0009] this invention was made in view of such a technical problem, and aims at offering the signal-line way (henceforth the signal-line way for RFs) of the electronic parts for RFs which cover the overall length in the characteristic impedance of the signal-line way with which one front face of a dielectric layer was equipped, can be made to be able to match with 50 etc.ohms etc. exactly, or can stop the reflection loss of the RF signal transmitted in the bending part of the signal-line way few.

[0010]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, the signal-line way for RFs of this invention While equipping one front face of a dielectric layer with a signal-line way, the front face of another side of the aforementioned dielectric layer is equipped with a mesh-like mesh ground plane. In the signal-line way of the electronic parts for RFs which made the characteristic impedance of the aforementioned signal-line way match with about 1 constant value by the mesh ground plane Into the dielectric-layer surface portion equipped with the mesh ground plane which counters through the aforementioned signal-line way and the aforementioned dielectric layer Or the same pattern as a signal-line way is put in order and equipped with the grand track for the mesh ground plane complement of a narrow width from it. the aforementioned signal-line way -- almost -- the same width of face -- While connecting to a mesh ground plane the part which overlapped the aforementioned mesh ground plane of the grand track and forming the bending part of the aforementioned signal-line way in an arc further It is characterized by having imitated the configuration of the bending part of the signal-line way formed in the arc, and forming in an arc the bending part of the aforementioned grand track which counters the bending part of a signal-line way.

[0011]

[Function] On the signal-line way for RFs of the above-mentioned composition, the grand track for a mesh ground plane complement was made to counter a signal-line way through a dielectric layer, and it arranges and prepares for the same pattern as a signal-line way. the part which overlapped the mesh ground plane of a grand track with it -- a mesh ground plane -- connecting -- **** -- a grand track -- a mesh ground plane -- minding -- the potential difference -- it enables it to ground few

[0012] Therefore, the overall length can be covered and the characteristic impedance of a signal-line way can be made to match exactly without a way piece in constant value, such as 50 etc.ohms, on a mesh ground plane and the grand track for the plain complement.

[0013] moreover, a grand track -- a signal-line way -- almost -- the same width of face -- or since it forms in a narrow width from it, the characteristic impedance of a signal-line way can be made to match with constant value exactly on a mesh ground plane and the grand track for the plain complement, without being too high in the grand effect over the signal-line way of a grand track

[0014] The width of face of **** of a mesh ground plane and the numerical aperture of the opening portion equivalent to the mesh are formed on the basis of the width of face of a signal-line way, respectively. That is, generally, **** of a mesh ground plane forms in the same width of face mostly with the width of face of a signal-line way, and the numerical aperture of the mesh of a mesh ground plane is defined in consideration of the width of face of **** the signal-line way 22 and a dielectric layer 10 as

[0015] Therefore, on the signal-line way of the above-mentioned composition, since the width of face of a grand track is mostly formed in a narrow width from the same width of face of it with the signal-line way, it can prevent filling the opening portion equivalent to the mesh of a mesh ground plane with a grand track, and heightening the grand effect of a mesh ground plane to the same value as a ground plane.

[0016] Moreover, since the bending part of a signal-line way is formed in an arc, the reflection loss of the RF signal transmitted in the bending part of the signal-line way can be stopped few.

[0017] Moreover, since the configuration of the bending part of a signal-line way is imitated and the bending part of the grand track which counters the bending part of a signal-line way is formed in an arc,

it can be made to match with constant value exactly by the grand track which formed the characteristic impedance of the bending part formed in the arc of a signal-line way in the above-mentioned arc which counters the bending part of the signal-line way, and the mesh ground plane of the circumference of it. [0018]

[Example] Next, the example of this invention is explained according to a drawing. the perspective diagram in which drawing 1 or drawing 4 shows the suitable example of the signal-line way for RFs of this invention, and drawing 1 shows the outline structure, drawing 2, drawing 3, or drawing 4 -- the -- the cross section is shown in part Below, this signal-line way for RFs is explained.

[0019] In drawing, 10, 12, and 14 are dielectric layers with the thin thickness it is thin from polyimide resin etc.

[0020] One front face of dielectric layers 10, 12, and 14 is equipped with the signal-line ways 22, 24, and 26 which consist of chromium, copper, nickel, etc.

[0021] The front face of another side of dielectric layers 10, 12, and 14 is widely equipped with the mesh ground plane 30 which carried out the shape of a mesh which consists of titanium, molybdenum, nickel, etc.

[0022] These signal-line ways 22, 24, and 26 and mesh ground planes 30 carry out etching processing, and form in a ceramic substrate (not shown) front face equipped with dielectric layers 10 and 12, 14 front faces, or those dielectric layers the thin film which it had by sputtering etc.

[0023] The signal-line ways 22, 24, and 26 like the signal-line way 20 shown in above-mentioned drawing 5 So that the opening portion 34 equivalent to the mesh of the mesh ground plane with which looked at on one front face of dielectric layers 10, 12, and 14 from the upper part, and it was equipped on the dielectric layers 10 and 12 of another side and 14 front faces may be crossed aslant have or Or like the signal-line way 20 shown in above-mentioned drawing 6, it arranged on one front face of dielectric layers 10, 12, and 14 in parallel with **** 32 of the mesh ground plane with which looked at from the upper part and the dielectric layers 10 and 12 of another side and 14 front faces were equipped, and prepares for it.

[0024] And the characteristic impedance of the signal-line ways 22, 24, and 26 of one front face of dielectric layers 10, 12, and 14 is made to match with about 50 etc.ohms etc. by the mesh ground plane 30.

[0025] Although the above composition is the same as that of the signal-line way 20 shown in conventional drawing 5 or conventional drawing 6 On the signal-line ways 22, 24, and 26 of drawing, to it, into in addition, the surface portions of the signal-line ways 22, 24, and 26 and another side of the dielectric layers 10, 12, and 14 which counter through dielectric layers 10, 12, and 14 the signal-line ways 22, 24, and 26 -- almost -- the same width of face -- or the same pattern as the signal-line ways 22, 24, and 26 is put in order and equipped with the grand tracks 42, 44, and 46 for the mesh ground plane 30 complement of a narrow width from it.

[0026] the dielectric-layer 10 inferior-surface-of-tongue portion specifically equipped with the mesh ground plane 30 which counters through the signal-line way 22 and a dielectric layer 10 as shown in drawing 2 -- the signal-line way 22 -- almost -- the same width of face -- or the same pattern as the signal-line way 22 is put in order and equipped with the grand track 42 of a narrow width from it or the dielectric-layer 10 upper-surface portion equipped with the mesh ground plane 30 which counters through the signal-line way 22 and a dielectric layer 10 as shown in drawing 3 -- the signal-line way 22 -- almost -- the same width of face -- or the same pattern as the signal-line way 22 is put in order and equipped with the grand track 42 of a narrow width from it two or more places which overlapped the mesh ground plane 30 of the grand track 42 -- **** 32 of a mesh ground plane -- respectively -- connecting -- **** -- the grand track 42 -- the mesh ground plane 30 -- minding -- the potential difference -- it enables it to ground few And microstrip line structuring of the signal-line way 22 of the dielectric-layer 10 upper surface or its inferior surface of tongue is carried out on the mesh ground plane 30 and the grand track 42. The overall length is covered and the characteristic impedance of the signal-line way 22 of the dielectric-layer 10 upper surface or its inferior surface of tongue is made to match exactly without a way piece in 50 etc.ohms etc. on the mesh ground plane 30 and the grand track 42.

with it.

[0027] Or as shown in drawing 4, it has the mesh ground plane 30 which carried out the laminating of the up dielectric layer 12 to the lower dielectric-layer 14 upper surface, and made the shape of a mesh lower dielectric-layer 14 inferior surface of tongue and the up dielectric-layer 12 upper surface, respectively. The plane of composition of the lower dielectric layer 14 and the up dielectric layer 12 is equipped with the signal-line way 24 of a narrow width, and the signal-line way 26 of ****, respectively. the signal-line ways 24 and 26 of a narrow width and ****, the up dielectric-layer 12 upper-surface portion which counters through the up dielectric layer 12, and the lower dielectric-layer 14 inferior-surface-of-tongue portion which counters through the signal-line ways 24 and 26 and the lower dielectric layer 14 of a narrow width and **** -- the signal-line ways 24 and 26 -- almost -- the same width of face -- or from it, the grand tracks 44 and 46 of a narrow width were arranged in the same pattern as the signal-line ways 24 and 26, respectively, and it is equipped with two or more places which overlapped the mesh ground plane 30 of the up dielectric-layer 12 upper surface of the grand tracks 44 and 46, and lower dielectric-layer 14 inferior surface of tongue -- **** 32 of a mesh ground plane -- respectively -- connecting -- **** -- the grand tracks 44 and 46 -- the mesh ground plane 30 -- minding - the potential difference -- it enables it to ground few And strip-line structuring of the signal-line ways 24 and 26 of a narrow width and **** with which the plane of composition of the up dielectric layer 12 and the lower dielectric layer 14 was equipped is carried out, respectively on the mesh ground plane 30 and the grand tracks 44 and 46 of the up dielectric-layer 12 upper surface and lower dielectric-layer 14 inferior surface of tongue. The overall length is covered and the characteristic impedance of the signal-line ways 24 and 26 of the narrow width with which the plane of composition of the up dielectric layer 12 and the lower dielectric layer 14 was equipped, and **** is made to match with 50 etc.ohms of constant value etc. exactly without a way piece with it, respectively on the mesh ground plane 30 and the grand tracks 44 and 46 of the up dielectric-layer 12 upper surface and lower dielectric-layer 14 inferior surface of tongue.

[0028] the grand tracks 42, 44, and 46 -- the width of face -- the signal-line ways 22, 24, and 26 -- almost -- the same width of face -- or it forms in a narrow width, and the grand effect of the grand tracks 42, 44, and 46 increases too much, or the grand tracks 42, 44, and 46 fill the opening portion 34 equivalent to the mesh of a mesh ground plane, and it makes the grand effect of the mesh ground plane 30 not increase too much from it

[0029] The bending part of the signal-line way 22 with which dielectric-layer 10 inferior surface of tongue or its upper surface was equipped, or the bending part of the signal-line ways 24 and 26 with which the plane of composition of the lower dielectric layer 14 and the up dielectric layer 12 was equipped is formed in the arc of circular **, respectively, as shown in drawing 1.

[0030] And it is made to stop the reflection loss of the RF signal transmitted in the bending part of the signal-line ways 22, 24, and 26 few.

[0031] The bending part of the grand tracks 42, 44, and 46 which counter through the bending part, the dielectric layer 10, the up dielectric layer 12, or the lower dielectric layer 14 of the signal-line ways 22, 24, and 26 imitates the configuration of the bending part of the signal-line ways 22, 24, and 26, and is formed in the shape of [of circular **] **, respectively.

[0032] And the characteristic impedance of the bending part formed in the arc of the signal-line ways 22, 24, and 26 is made to match with 50 etc.ohms of constant value etc. exactly by the bending part formed in the shape of [of the grand tracks 42, 44, and 46] **, and the mesh ground plane 30 of the circumference of it.

[0033] The grand tracks 42, 44, and 46 carry out etching processing, and form in a ceramic substrate (not shown) front face equipped with dielectric layers 10 and 12, 14 front faces, or those dielectric layers the thin film layer which consists of the titanium which it had by sputtering etc., molybdenum, nickel, etc. It is made to equip simultaneously dielectric layers 10 and 12, 14 front faces, or a ceramic substrate front face with the mesh ground plane 30 in piles using the same thin film layer in that case. Or it is made to equip dielectric layers 10 and 12, 14 front faces, or a ceramic substrate front face equipped with the mesh ground plane 30 with the grand tracks 42, 44, and 46 in piles at the mesh ground plane 30.

[0034] The signal-line way for RFs shown in drawing 1 or drawing 4 is constituted as mentioned above.

[0035]

[Effect of the Invention] According to the signal-line way for RFs of this invention, the overall length can be covered and the characteristic impedance of the signal-line way which tells the RF signal with which one front face of a dielectric layer was equipped can be made to match exactly without a way piece in 50 etc.ohms of constant value etc. on the mesh ground plane with which the front face of another side of a dielectric layer was equipped, and the grand track for the plain complement, as explained above.

[0036] Moreover, the bending part of a signal-line way is formed in an arc, and the reflection loss of the RF signal transmitted in the bending part of the signal-line way can be stopped few.

[0037] Moreover, the characteristic impedance of the bending part of a signal-line way can be made to match with 50 etc.ohms of constant value etc. exactly by the bending part of the grand track which imitated the configuration of the bending part of a signal-line way, and was formed in the arc, and the mesh ground plane of the circumference of it.

[0038] and the signal-line way with which the dielectric-layer front face was equipped -- a RF signal -- transmission loss -- it becomes possible to tell efficiently few

[Translation done.]